ENGINEERING ABSTRACTS

SAMPLE ROAD OF STEEL IS TESTED IN ILLINOIS

Highways of steel, with concrete surfaces, may revolutionize road building and provide a new market for steel products.

Three fifty-foot sections of such a road have been laid on a principal roadway near Springfield, Illinois. Under one section blue annealed flat steel sheets are used; galvanized and corrugated sheets are used on the other two. After the road has been rolled and the subgrade prepared, the steel section and the curbs are laid. A mastic sand cushion is laid over the steel on which is a layer of 2½ or 3-inch brick with asphaltic filler poured into the interstices between the bricks.

The engineers hope that such a base as this will prove to be indestructible with a smooth riding surface and that the concrete surface will meet the changes in temperature without cracking or breaking. A road so constructed will enable workmen to repair a road by merely removing the faulty part of the road in sections.

—*The Ohio State Journal.*

HOOVER DAM READY FOR BIDDING

The bids for this dam and appurtenant structures will be opened March 4, 1931. It is hoped that the contract can be let by April 1, and that work will begin next summer. Entire completion is scheduled for seven years after awarding of the contract, but preliminary power is expected five years and four months after starting of construction. The dam, diversion tunnels, power house, spillways, intake and outlet works, and inclined elevator on the Nevada side of the gorge are to be included on the single contract.

The major items of the project consist of: the dam, four fifty-foot diversion tunnels (two of which will later be used as spillway-conduits and two as penstock tunnels), the power house containing twelve or sixteen units, four thirty-foot diameter intake towers, four outlet valve houses, two overflow spillways seven feet long and connected to the diversion tunnels by inclined shafts fifty to seventy feet in diameter, and the inclined freight elevator.

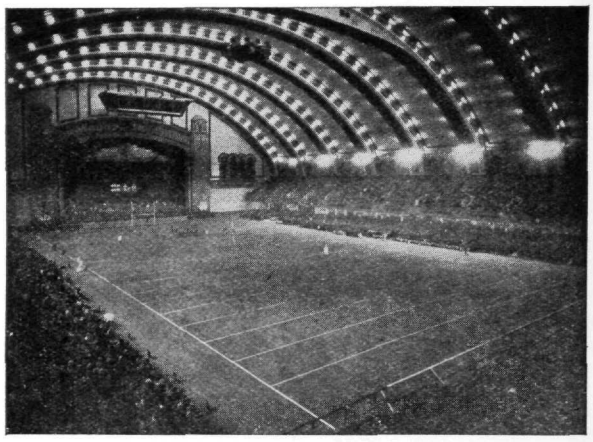
The dam is a concrete gravity section structure 730 feet high and 1,180 feet long on the crest and is to be built in the form of an arch of 500-foot radius along the axis.

—*Engineering News-Record.*

FIRST INDOOR FOOTBALL GAME ATTRACTS 20,000

In the Atlantic City Auditorium the football teams of Washington and Jefferson College and Lafayette College recently met in the first indoor football game. Playing before a crowd of approximately 20,000, many of whom were in formal evening clothes, the red and black of Washington and Jefferson triumphed over the Eastonians by a score of 7 to 0.

To provide ample illumination for the game, the normal lighting equipment of the auditorium, which utilizes 600,000 watts, was supplemented by the addition of a power flood-lighting system using another 200,000 watts. Using a white football and playing in the light provided by the two lighting systems, the players experienced no difficulties due to poor visibility.



The First Indoor Gridiron

The roof of the auditorium is supported by ten pairs of 3-hinge trusses weighing 220 tons per pair. They have a clear span of 350 feet and a clearance above the playing field of 135 feet. It was noted during the game that the highest and longest punts seemed puny in their relation to the roof of the auditorium.

The interior of the auditorium measures approximately 500 feet by 300 feet; therefore, ample room for a full-sized football field with comfortable margins on the end zones and the sidelines was available. The absence of pillars in the auditorium assured unobstructed vision. The field was composed of dirt brought from the interior of New Jersey in 48 freight cars. The total weight of the dirt laid and rolled to perfect playing surface was 2,500,000 pounds.

The formal clothes and the very noticeable lack of hats on both men and women constituted new notes among a crowd witnessing a football game, usually associated with fur coats rather than with the black and white and gay colors of evening dress.

METAL RARER THAN PLATINUM OBTAINED BY ELECTRICITY

One pound of indium, one of the rarest of metals, has been produced at Cleveland by an electric process. This amount is valued at $7,000, nearly ten times as much as platinum. It is a white, lustrous metal, very soft and ductile, slightly heavier than zinc, and can be melted with a match. Hitherto it has been mostly a laboratory curiosity because it was so expensive to produce, but metallurgists now predict that commercial uses will be found for it. It has already been employed as a bearing metal, and has been mixed with another metal, gallium, to make an alloy for fused quartz thermometers measuring temperatures up to about 1,800 degrees Fahrenheit. Indium is obtained by electrolysis. Accurate tem-

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perature controls and the use of proper kinds of electrodes are essential. The first pound of the metal came from many carloads of crude ore. It is rather widely distributed in minute amounts in most zinc blendes and in some tin ores.

A MILLION DOLLAR WINDOWLESS PLANT

The most efficient and amazing plant in the world is being erected at Fitchburg, Mass. This structure will contain no windows or skylights.

The corners in the plant will not be dark, every part of the building being lighted to the same degree. This is made possible by having the ceiling of the structure studded with 1,000-watt ultra-violet-ray lamps. No workman will have to gaze at blank walls as the interior walls will be decorated and painted with geometrical designs which will ease the eyes of the workmen. The plant will be insulated much on the order of a refrigerator. The temperature of the building will remain constant, the regulation of the heat being automatically controlled.

The building is a one-story structure which will cost one million dollars. The ground dimensions are 570 feet by 360 feet with a height of 25 feet. This plant, which will be completed about March 1

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of this year, is expected to increase the efficiency of the workmen at least one-third.

—*Popular Mechanics.*

FRENCH PURSUIT PLANES

Of the four largest air powers of the world at present, United States, France, Italy, and England, France has the largest air force in point of numbers. In actual numbers, France has 1,300 first line military aircraft in service; Italy 1,100; United States 950; Great Britain 780. Besides the 1,300 France has also approximately 2,700 aircraft of which about half are in service for first line operations and the rest kept ready for immediate assembly. Since the war France has shown greater strides in the development of military aircraft than has any other nation, if we are to judge by the number and variety of types produced by their engineers.

Outstanding among the types produced in France is the jockey type of Chasse plane—a single seater pursuit ship with an empty weight not exceeding 2,646 pounds. These ships have a very good performance for their class. The monoplane is more popular with the builders of pursuit ships than is the biplane and is practically always of the parasol type with a fully braced wing. Metal is used to a great extent in construction although a few manufacturers are still using wood and wood-and-metal composition. The armament on these ships consists mostly of two

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Vickers or Darne machine guns firing through the propeller. The power range of these Chasse planes is from 400 to 600 horsepower and their endurance is between three and three and a half hours.

A number of the French pursuit planes are built around the Hispano-Suiza engine, a twelve cylinder, water cooled engine of the "Vee" type. Some types of this engine develop as high as 580 horsepower. The Hispano motor is particularly adaptable to streamlining which is one of the factors that make it so popular. Other water cooled plants that are used are the Lorraine-Dietrich and the Renault. Gnome-Rhone engines are the principal air cooled type used.

The best known of the French pursuit or Chasse planes are the Morane-Saulnier; the Dewoitine; the Bernard; the Amoit; the Loire-Gourdou-Lesuerre; the Wibault; the Bleriot (better known as the Spad); and the Nieuport-Delage.

—Aero Digest

DEVELOPMENT OF THE COLUMBIA RIVER

The 110 miles between Portland and the mouth of the Columbia river have needed widening and deepening for half a century. The channel is 30′ x 300′ and is being increased to 35′ x 500′. The initial expenditure was estimated at $1,366,000 with an annual maintenance cost of $665,000. The spring floods cause a rise of from 20 to 75 feet in various parts of the channel and the flow often increases 20 times the normal. The river also carries untold amounts of silt. With these conditions it becomes necessary to build 18 new dykes and to extend 28 old ones and remove about 18,000,000 cubic yards of silt from the bed.

—Scientific American.

NEW BORING MACHINE AVOIDS TEARING UP PAVEMENTS

The tearing up of streets and highways for the placing of pipes and conduits will be reduced to a minimum when a remarkable new device, the Hydrauger, comes into general use, according to a group of California engineers and business men who have perfected the development and have this week placed it in large-scale production in San Francisco.

This device is a patented hydraulic auger, already used for several months with practical success in parts of the San Francisco metropolitan area, demonstrating that it can bore under wide thoroughfares without the necessity for trenching, which has torn up pavements in such an unsightly and bothersome manner under methods which have prevailed heretofore. Automobiles have rolled unimpeded over the surface of the Redwood Highway, for instance, while the boring was being made beneath for the placing of three-inch pipe.

This invention is notable in that it has succeeded in overcoming the tendency of previous boring machines to drill a gradually declining hole, due to gravitation. The offsetting of this force is one of its outstanding features. An operator can direct its bore with the precision of a marksman, at distances of forty feet bringing it out to within two or three inches of the point at which it is aimed. The machine is capable of

boring at distances of one hundred feet or more, without the necessity for trenching.

Not only does its use obviate the necessity for cutting up streets and highways, but the new boring machine also is used for laying pipe under gardens and buildings, without disturbing the top soil.

The savings involved in the use of the new machine are declared to be very great, in some cases the cost of the work being only one-tenth of the cost under old methods, it is claimed.

BENDING PIPE FOUR FEET IN DIAMETER

By means of some new equipment, devised by the Taylor Forge and Pipe Works of Chicago, pipe up to fifty inches in diameter can be bent to any radius desired.

The pipe, after being packed tightly with sand to prevent buckling, is heated up in a cylindrical furnace to the proper temperature for bending. Water gas is used as a fuel, giving an intense heat concentrated at the point where the bend is to be made. Above the furnace is a tower from the top of which two arms extend down and fasten, by means of a band, to the point on the pipe where the bend is to start. The pipe is bent by pulling the two arms upward by motor.

In order to bend pipe to a radius greater than the length of the arms, a templet is used. Placed directly beneath the pipe, the templet has an outline corresponding to the outside of the curve to which the pipe is to be bent. The pipe is then pulled up the templet, sliding by means of a roller mounted on the under side of the pipe. When the roller starts to ride above the templet, the arms are automatically lowered by lowering the head to which they are attached.

Fifty-inch pipe with walls varying from ½ to 1 inch in thickness can be bent with this equipment.—*Machinery.*

TWO ELEVATORS USE SAME SHAFTWAY

An elevator of a new type, with two cars operated separately in the same shaftway, has been built and placed in regular service in an office building at East Pittsburgh, Pa.

It has long been obvious that if cars serving both the upper and lower floors of a high building could be operated in the same shaftways, the shaftways now devoted exclusively to "local" service could be in part, or entirely, omitted and a considerable amount of additional revenue-producing floor space could be secured.

For example, a study of several buildings erected recently in Chicago and New York shows that if these buildings had been designed for dual elevators, floor space that could have been rented for from $35,000 to $85,000 a year would have been saved. At 6 per cent interest, these sums represent capital investments ranging from a half million to over a million dollars; and it can be said that the entire elevator installation for many buildings over 20 stories high can be financed from the additional income made possible by substituting dual elevators for separate banks of local and express cars.

The engineering difficulties involved in the designing of a practical and perfectly safe dual elevator system are very great, but as shown by the

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actual installation at East Pittsburgh, it has been possible to solve them satisfactorily.

The details of the operation of a dual elevator will naturally vary with the height and character of the building, the number and speed of the elevators and many other conditions, but the following will illustrate some of the features of an installation for a 20-story building.

The upper car of the two is the express car. It starts from the street level and, running without stops to floor 11, serves the floors from that point to the top. It is entirely unrestricted as to its operation except that it is automatically prevented from running downward while the lower car is running upward. It can, however, be "inched" up or down by hand in emergency cases.

As soon as the express car is out of its way, the lower or local car, which has been waiting at a basement level, rises to the street level and then serves the lower ten floors. It, too, is unrestricted except in one respect—it cannot approach the upper car within a predetermined distance. Should the attempt be made to run the lower car up against the upper one, it will automatically be slowed down and stopped at the proper point and held there until either its operator runs it downward or the upper car moves farther upward.

Car operation is so timed that both cars will normally reach their upper limits of travel at about the same time, but if the express car arrives at its destination first, it is held there until the local car completes its run or starts downward.

On the descent of the two cars, the same safety precautions apply—the lower car cannot run upwards toward the upper car, and the upper car will be stopped if it comes too close to the lower.

Safety is insured by the use of three independent safety systems, one of which is electrical while the other two are mechanical. A signal system in the car informs the operator at all times of his own position and that of the other car and also indicates exactly what is happening should his car for any reason become subject to automatic control.

The dual elevator at East Pittsburgh serves 11 stories. The cars operate at 600 feet per minute and each can carry 3,000 pounds.

A fellow who has been in consultation with one of the guards at the new bridge over the Hudson at Poughkeepsie learns that traffic has been heavy, and practical jokes numerous. The guard said that in the first two weeks of operation thirty-four parcel-post packages had arrived from various places, all containing assorted odds and ends, including many old razor blades, and a note requesting that the stuff be thrown off the bridge. This always happens when a new bridge is opened, the guard said; nobody seems to tire of the joke—except him.

Fortune Teller: "I tella your fortune, meester."
Freshman: "How much?"
F. T.: "Twenty-five cents."
Freshman: "Correct."